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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,341	06/25/2003	Matthew O'Donnell	UOM 0274 PUSP	2637

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EXAMINER

SHAY, DAVID M

ART UNIT	PAPER NUMBER
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3735

MAIL DATE	DELIVERY MODE
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07/25/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/603,341

Applicant(s)

O'DONNELL, MATTHEW

Examiner

david shay

Art Unit

3735

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on May 3, 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-8,12-15,18-21,23,24,27-29,36 and 40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-8,12-15,18-21,23,24,27-29,36 and 40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on July 17, 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 3735

Applicant reminds the examiner that a radiation force is due to the absorption or reflection of an acoustic wave, and deduces from this that a substantially continuous radiation force can be exerted by applying a continuous acoustic wave to a microbubble. While the examiner concedes that the portion of the publication entitled "The Acoustic Bubble" supplied by applicant does appear to indicate that the term "radiation pressure" can be broad enough to include pressure from acoustic radiation and that such radiation pressure can be used to transmit some kind of force, the examiner has been unable to find any reference to "continuous radiation force" or "substantially continuous radiation force" therein. However, since the claims are to be given their broadest reasonable interpretation, and since even a pulsed source of radiation can be considered "substantially continuous" depending on the duty cycle thereof, the examiner withdraws the objection and rejection based on enablement issues concerning claims 5 and 28. However, applicant has not enablingly taught how to produce the entirety of the step recited in claim 20. The mention that the microbubble "operates as a high frequency, high precision acoustic source" in the originally filed disclosure does not provide the necessary teachings of the means by which to produce, control, and direct the shockwave so it "operates as a high frequency, high precision acoustic source". As an example, a disclosure reciting "the tin can being configured to act as an antigravity source" does not provide sufficient information to one of ordinary skill in the art to enable one of ordinary skill in the art to configure a tin can to produce an antigravity field. Thus these arguments are not convincing, and the rejections have been maintained.

With regard to claims 7 and 8 et cetera, it is not the recitation of the terms mico-Newtons and nano-Newtons (or the numerical expression of the exact same concept as the prefixes), per

Art Unit: 3735

se, but the range implied by use of the term “level” in conjunction with these recitations. For example, would a force of 5 GigaNewtons qualify as “a force in the micro-Newton level”, since a GigaNewton is merely $10^{19} \times 10^{-6}$ Newtons? The amended phrases are still unclear for the same reason. While it is noted that applicant asserts that 1012 Newtons is not in the 10^{-6} Newton level, the examiner must respectfully note first of all, that applicant’s remarks cannot take the place of evidence, and there is no evidence that the phrases in the claim must be construed to exclude values of gigaNewtons, and secondly, that terms of this nature have been held to be indefinite because the specification lacked some standard for measuring the degree intended (see MPEP 2173.05(b)(F)). With regard to claim 14, applicant “reminds” the examiner that “a microbubble with a diameter of less than 1 micron is a nanobubble”. The examiner must respectfully point out that, according to the source referenced by applicant, this is apparently not the definition of a nanobubble, since Microbubbles typically have diameters of the order of 1 to 2 microns, and are sometimes as small as a few hundred nanometers...” (see the penultimate sentence on page 59). Thus clearly, microbubbles may be substantially smaller than 1 micron. However, it is also noted that as the submitted publication does discuss the use of, and thus implicitly the production, of nanobubbles, it is clear that one of ordinary skill in the art would readily understand how to produce, recognize and use nanobubbles, as well as distinguish them from microbubbles. Thus the indefiniteness rejection based on the use of these terms are also withdrawn.

With regard to the art rejection, applicant argues that LeClair teaches the formation of micro-jets brought about by the collapse of the bubbles, pointing to the disclosure thereof at column 4, lines 32-54. While this is noted, it does nothing to remove the disclosure at column 6,

Art Unit: 3735

line 38 to column 9, line 14, as already pointed out by the examiner. This disclosure, which will be described in an exemplary fashion with respect to Figures 3a-3e, teaches that two bubbles are formed (elements 202 and 200 in Figure 3a and column 6, lines 42-44); these are formed “at approximately the same time” (column 6, lines 44-45); which then expand (column 6, lines 45-47); since the bubbles are formed by vaporizing fluid, as can be seen from the portion of LeClair reproduced in the instant response (see pages 8-9 thereof), the force from the pressure wave generated by the rapidly expanding bubble, being in a liquid, will be substantially completely transmitted to the adjacent bubble, and thereby displace it. Being as acoustic radiation is merely a pressure wave (see page 19 of applicant’s submission “The Acoustic Bubble”), the pressure wave generated by LeClair, is simply acoustic radiation. As applicant has pointed to no reason why the ordinary processes described by the physics of the situation, such as the acoustic radiation from one bubble displacing the other, would not operate in the method of LeClair, as it does in the method of applicant, these processes must be assumed to be present in LeClair as well. Since the bubbles survive subsequent to the expansion phase of the bubbles, as can be seen from the figures and the attendant disclosure, the claimed process reads on the this process.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim 20 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The originally filed disclosure is silent on the manner in which the “at least one laser pulse also

Art Unit: 3735

creates at least one acoustic shock wave via LIOB wherein the at least one acoustic shock wave operates as a high frequency, high precision acoustic source”.

Claims 3, 7, 8, and 11-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 is indefinite as the exact meaning of the term "force in the 1×10^{-6} Newton to 1×10^{-9} Newton level" is unclear. Claim 8 is indefinite as the exact meaning of the term "force in the 1×10^{-12} Newton to 1×10^{-15} Newton level" is unclear. Claim 11 is indefinite, because it is unclear what further limitation requiring that the “acoustic wave causes the microbubble to move ...” provides when claim 1, from which claim 11 depends, requires that the acoustic wave “displace a central portion of the microbubble”.

Claims 1, 2, 4-8, 11, 13-15, 19-21, 23, 24, 27-29, and 36 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by LeClair.

See especially Figures 3-6 and column 6, line 38 to column 9, line 14, wherein the leading edge of the laser pulse will begin to create a bubble, which the following portion of the pulse will propagate through, and wherein the ultrasound wave generated by the bubble will exert a substantially continuous force over a very small time scale.

Claims 18 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over LeClair. Ozkan et al teaches a method of cell patterning. LeClair teaches manipulating materials using microbubbles. It would have been obvious to the artisan of ordinary skill to employ a femtosecond laser pulse to generate the microbubble of LeClair, since this is not critical; is well within the skill of one having ordinary skill in the art; and provides no unexpected result, and

would deposit the energy in the material quickly, thereby minimizing the escape of thermal energy into the surrounding medium, thus producing a device and method such as claimed.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozkan et al in combination with LeClair. Ozkan et al teaches a method of cell patterning. LeClair teaches manipulating materials using microbubbles. It would have been obvious to the artisan of ordinary skill to employ the microbubble method of LeClair in the patterning of Ozkan et al since the method of LeClair does not require that charges be induced on the items to be patterned, or to employ patterning in the method of LeClair, since the method of LeClair can be used for any purposes, as taught by LeClair, and in either case to measure the elasticity of the material, since this provides no unexpected result, and is well within the scope of one having ordinary skill in the art, thus producing a device and method such as claimed.

Applicant's arguments filed May 3, 2007 have been fully considered but they are not persuasive. The arguments are not persuasive for the reasons set forth above.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 3735

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to david shay whose telephone number is (571) 272-4773. The examiner can normally be reached on Tuesday through Friday from 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Marmor, II, can be reached on Monday, Tuesday, Wednesday, Thursday, and Friday. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



DAVID M. SHAY
PRIMARY EXAMINER
GROUP 330